

## Informational Quality versus Informational Quantity: The Perils of Navigating the Space of Flows

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## Informational Quality versus Informational Quantity: The Perils of Navigating the Space of Flows

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INFORMATIONAL QUANTITY  
VERSUS INFORMATIONAL QUALITY:

THE PERILS OF NAVIGATING THE SPACE OF FLOWS

This paper outlines the conceptual framework of the POLYNET transnational study. We explain how four key concepts - the Mega-City Region, Polycentricity, Advanced Producer Services, and Information Flows - underpin the overarching research objective: the empirical investigation of emergent urban Mega-City Region processes in North West Europe through the analysis of ‘regional spaces of flows’. This analysis, using quantitative and qualitative approaches, produces new insights and raises new questions that inform important spatial policy debates on regional ‘polycentricity’, considered in depth in the study’s diverse regional narratives.

Mega-City Region	Morphological/functional polycentricity	First Cities
Advanced Producer Services	Spaces of Flows	Functional specialisation

QUANTITE ET QUALITE DE L'INFORMATION:

LES DANGERS DE LA NAVIGATION A TRAVERS LES FLUX  
D'INFORMATIONS  
Kathryn Pain et Peter Hall

Cet article décrit brièvement le cadre conceptuel de l'étude transnationale POLYNET. Nous expliquons comment quatre grands concepts, la mégalopole régionale, la polycentricité, les services de producteurs de pointe et les flux d'informations, étayent l'objectif déterminant de la recherche : l'analyse sur des processus des mégalopoles régionales

urbaines émergentes dans le nord de l'Europe occidentale par l'examen des « espaces régionaux de flux ». Cette analyse, qui utilise des approches quantitatives et qualitatives, génère de nouvelles informations et suscite de nouvelles questions qui contribuent aux grands débats sur la politique de l'espace en matière de polycentricité régionale, examinée en profondeur dans les divers documents régionaux de cette étude.

**Mot-clé : mégalopole régionale, polycentricité morphologique/fonctionnelle, première ville, service de producteurs de pointe, espaces de flux, spécialisation fonctionnelle.**

JEL codes: O10; O18; O20; R11

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Informationelle Quantität oder informationelle Qualität: die Gefahren der Navigation im Raum von Strömen

Kathryn Pain and Peter Hall

In diesem Beitrag wird der konzeptuelle Rahmen der transnationalen POLYNET-Studie beschrieben. Wir erläutern, wie vier zentrale Konzepte – Megastadtregion, Polyzentrität, Wirtschaftsdienstleistungen und Informationsströme – dem übergreifenden Forschungsziel zugrundeliegen: der empirischen Untersuchung der neu entstehenden Megastadtregionsprozesse in Nordwesteuropa durch die Analyse der 'regionalen Räume von Strömen'. Aus dieser Analyse, für die quantitative und qualitative Ansätze zur Anwendung kommen, gehen neue Einblicke und Fragen hervor, die sich auf die wichtigen raumpolitischen Debatten über regionale 'Polyzentrität' auswirken, welche in der Studie anhand verschiedener regionaler Beispiele ausführlich erörtert werden.

Megastadtregion

Morphologische/funktionale Polyzentrität

Erste Städte

Wirtschaftsdienstleistungen

Räume von Strömen

Funktionale Spezialisierung

JEL codes: O10; O18; O20; R11

CRES-2006-0248.R1

¿Cantidad de la información o calidad de la información?: El peligro de la navegación en el espacio de flujos

Kathryn Pain and Peter Hall

En este artículo destacamos la estructura conceptual del estudio transnacional POLYNET. Explicamos cómo los cuatro conceptos principales –la región mega-ciudad, la policentralidad, los servicios avanzados de productores y los flujos de información– confirman el objetivo de investigación predominante: la investigación empírica de los procesos emergentes en las regiones mega-ciudad urbanas al noroeste de Europa mediante el análisis de los ‘espacios regionales de flujos’. Con ayuda de enfoques cuantitativos y cualitativos, en este análisis aportamos nuevas perspectivas y planteamos nuevas preguntas que responden a debates importantes sobre la política espacial en la ‘policentralidad’ regional que se analiza a fondo en diversos estudios sobre ejemplos regionales.

Región mega-ciudad  
Policentralidad morfológico/funcional  
Primeras ciudades  
Servicios avanzados de productores  
Espacios de flujos  
Especialización funcional

JEL codes: O10; O18; O20; R11

INTRODUCTION

The central purpose of the POLYNET study has been to investigate the functioning of large polycentric city-regions that are a feature of densely urbanised development in North West Europe. Academic teams from eight city-regions have come together to examine and compare the dynamic processes that are transforming these major European economic regions under conditions of contemporary globalisation: South East England, Randstad Netherlands, Central Belgium, RhineRuhr, Rhine-Main, Northern Switzerland, the Paris Region and Greater Dublin. The principal transnational findings are fully presented in the book *The Polycentric Metropolis* (HALL and PAIN, 2006).

The core of the study has examined the inter-city linkages and flows within and between the eight regions that also connect this European space to the wider global economy. This paper describes the theoretical and methodological challenges encountered and their implications for further research in this field. Here, we first introduce four key concepts which run through the study; then, we turn specifically to the question of the role of qualitative interview-based data in describing and interpreting the flows of information between individuals and companies in 'Advanced Producer Services' within the emergent urban phenomena described in the study as polycentric 'Mega-City Regions'.

#### FOUR KEY CONCEPTS

POLYNET attempts to unpack and analyse four central theoretical concepts: the Mega-City Region, Polycentricity, Advanced Producer Services, and Information Flows. They prove to be closely and significantly interrelated.

##### *The Mega-City Region*

The 'Mega-City Region' (MCR), first identified by Jean Gottmann in his pioneering study of *Megalopolis* (GOTTMANN, 1961), has more recently been rediscovered in areas like the Pearl River Delta and Yangtze River Delta regions of China, the Tokaido (Tokyo–Osaka) corridor in Japan, and Greater Jakarta (XU and LI, 1990; MCGEE, 1995; YEUNG, 1996; SIT and YANG, 1997; MOGRIDGE and PARR, 1997; HALL, 1999; SCOTT, 2001; YEH, 2001). It consists of a number of cities and



towns, between ten and 50 in number, physically separate but functionally networked through what Castells terms the ‘space of flows’ (CASTELLS, 1996, pp. 376–428), clustered around one or more larger central cities, and drawing economic strength from a functional division of labour.

*Polycentricity*

An essential feature of such regions is that in different degrees and different ways they are *polycentric*: by definition, they consist of more than one urban place. Polycentricity may be simply geographical or *morphological*, in the sense that physically separate urban units of similar size, co-exist in one region. Typically, however, ever since such polycentric regions as the Randstad and Rhine-Ruhr were first identified in the 1960s (HALL, 1966), the clear implication has been that they are characterised by a weak or flat hierarchy: there is no dominant city. One well-known way of measuring this is through an old technique used by geographers, the rank-size rule: if cities and towns forming part of a system (which can be a continent, a nation, or a region) are arrayed on double-logarithmic paper, by rank on the x-axis and by (population) size on the y-axis, then a truly polycentric system would produce a distribution along a line at 45° to both axes. In other words, the largest place would have a population double that of the next, and so on, without any sign of primacy at the top of the distribution. POLYNET uses such an analysis in an early attempt to measure the relative polycentricity of the eight MCRs (HALL and PAIN, 2006, p. 51): it shows that only RhineRuhr approximates to true polycentricity, South East England and the Paris Region are in contrast quite primate, while most other regions - including those often regarded as polycentric, such

as the Randstad - could be called semi-primate, with one or more dominant cities superimposed on a predominant lognormal distribution.

But this says nothing about how the constituent urban units relate to each other. More interestingly, we can speak of *functional*, as opposed to simple morphological, polycentricity: these units interrelate in complex ways, through exchanges of people and goods and information. Measuring these relationships obviously depends on the quantity and quality of the available information. One of the commonest ways, because data are readily available for most countries, is daily commuting. Since the 1950s, American urban researchers have used and successively refined a concept now known as the Metropolitan Statistical Area (MSA). This is essentially based on a central city (or cities), plus a surrounding ring from which significant numbers of commuters (typically 15% or more of the resident workforce) travel daily to that city. Such a concept has been widely used in UK and then European urban studies (HALL *et al.*, 1973; HALL and HAY, 1980; CHESHIRE and HAY, 1989). POLYNET further refines the definitions used in the earlier GEMACA study (IAURIF, 1996) and uses such Functional Urban Regions (FURs) as the basic statistical building blocks of its analysis. As a preliminary analytic device, it adopts a semi-arbitrary definition: a MCR is provisionally defined simply in terms of contiguous FURs, without any evidence (positive or contrary) of relationships between these FURs. This is done so that preliminary statistical analysis can then be made of possible relationships, using commuting data. Two such analyses are made in the first stage of the POLYNET research. First, commuter flows are mapped and inspected to find how far there are strong relationships that 'by-pass' the 'First City' (a term of art to indicate the largest city, chosen to avoid the term 'primate') or cities. Such flows do appear important in

a number of the regions, but the patterns are not always the expected ones. In South East England, where London attracts remarkably strong commuter movements from quite distant places up to 140 miles away, there is a remarkable west-east split: the area west of London also shows a strong superimposition of criss-cross flows bypassing the capital, while the area to the east (which admittedly is bisected by the Thames estuary) shows no such pattern. In the Randstad, there are relatively weak flows between the northern ‘wing’ (Haarlem-Amsterdam-Utrecht) and the southern ‘wing’ (Leiden-Den Haag-Rotterdam - Dordrecht), and also between areas in Brabant south of the Randstad and the Randstad itself.

Secondly and alternatively, POLYNET attempts to measure polycentricity by analysing *lack* of commuting: in other words, the relative self-containment of the individual FURs, using an index devised long ago by Ray Thomas (THOMAS, 1969). It is found that, beyond some critical commuting distance from the First City in each MCR - typically about 60 kilometres - FURs become quite strongly self-contained, with some 75-85% of working people living and working in the same FUR. POLYNET uses the data to produce two indices of polycentricity. The expression for special functional polycentricity is

$$P_{SF}(N) = (1 - \sigma_{\partial} / \sigma_{\partial \max}) \cdot \Delta$$

where:

- $P_{SF}$  is special functional polycentricity for a function  $F$  within network  $N$ ;
- $\sigma_{\partial}$  is the standard deviation of nodal degree;
- $\sigma_{\partial \max}$  is the standard deviation of the nodal degree of a 2-node network  $(n_1, n_2)$  derived from  $N$  where  $d_{n1} = 0$

and  $d_{n2}$  = value of the node with highest value in  $N$ .

$\Delta$  is the density of the network.

The expression for general functional polycentricity is:

$$P_{GF}(N) = [(1 - \sigma_{\partial} / \sigma_{\partial max}) \cdot \Delta] / n$$

where:

$P_{GF}(N_1, N_2, \dots, N_n)$  is general functional polycentricity for functional networks  $N_1, N_2, \dots$

$N_n$ ;

and the sum is taken over all  $P_{SF}$

$n$  is the number of networks.

Remarkably, the result is very weak polycentricity in all eight MCRs: the index varies from a lowest value, for the traditionally ‘monocentric’ region of Paris Region, as low as 0.02, to a highest value, for the traditionally ‘polycentric’ regions of the Randstad and RhineRuhr, of only 0.15–0.20. But the comment of the Randstad team is relevant here:

A value of 1.0 would mean that all FURs in the greater Randstad area are equally well connected to each other in terms of commuter flows and that the entire working population works in a place different from their place of residence. Next to being a polycentric utopia, it would also be a clear recipe for traffic chaos and environmental degradation (WERFF VAN DER *et al.*, 2005, p. 19; q. HALL and PAIN, 2006, p. 51).

Previous research in the Netherlands and international comparisons between this and German and British studies (KLOOSTERMAN and MUSTERD, 2001; IPENBURG and LAMBREGTS, 2001; TAYLOR *et al.*, 2003) suggest that indeed, polycentric urban regions in North West Europe may exhibit features that conflict with ESDP sustainability objectives.

This reservation is significant because the European Spatial Development Perspective (EUROPEAN COMMISSION, 1999) elevates the active *encouragement* of polycentricity, or *polycentrism*, into a central policy objective. But it is important to realise here that as well as different *kinds* of polycentricity (morphological versus functional), there are also different *scales* of polycentricity: polycentricity at one scale may mean monocentricity at another (PAIN, 2005, p. 50; NADIN and DUHR, 2005, p. 82). At the EU level, *polycentricism* in the ESDP means promoting alternative centres, outside the ‘Pentagon’ bounded by London, Paris, Milan, Munich and Hamburg, into ‘gateway’ cities elsewhere in Europe, many of which are national political or commercial capitals serving wide territories in Ireland, the Iberian peninsula, Scandinavia and East Central Europe. Paradoxically, this may help promote greater *monocentricity* in these peripheral nations, as capital and labour are drawn to leading cities, thus creating regional imbalances between ‘core’ and ‘periphery’ within each country: a situation observable in and around Dublin, Lisbon and Madrid in the 1980s and 1990s, and around Budapest, Prague, Warsaw and Tallinn in the 2000s. Further, as already seen, in the largest such national capital regions, there may also be migration of people and employment and capital investment from the First City to other urban places, with lower-level service functions dispersing from higher-order central cities to lower-order cities (LLEWELYN DAVIES, 1996).

### *Advanced Producer Services*

Such migration could be highly significant, because a basic starting-point of the POLYNET study is that - in contrast to the MCRs of China, whose polycentric urban networking is a key to the astonishing performance of their *manufacturing* economies - European '*Global MCRs*' are a specific form of Scott's 'Global City-Region' (SCOTT, 2001). They occupy a distinct position in the new global division of labour, as centres for the generation of knowledge-intensive *Advanced Producer Services* (APS): clustered activities which play a key role in providing specialized services, embodying professional knowledge and processing highly complex information, to other businesses and to each other. They are distinct from the broader group of diverse knowledge-intensive services described by Peter Wood as:

... new and growing types of services, promoting new ways of doing things. These include such diverse activities as television production companies, new types of financial intermediary, contract cleaning corporations and 'bucket-shop' travel agencies. Where the provision of knowledge about change is their purpose, these activities may generally be described as 'knowledge-intensive services' (WOOD, 2002, p. 3).

POLYNET focuses on eight core Advanced Producer Services: accountancy, advertising, banking/finance, design consultancy, insurance, law, logistic services and management consultancy/IT. Their essential common characteristic is that they generate, analyse, exchange and trade in *information*: they are key intermediaries in

the “knowledge economy” which dominates the eight POLYNET MCRs. Because these services are increasingly provided by very large firms with offices in multiple city locations world-wide, flows of information and interactions within and between APS firms and offices have a crucial role in linking cities to the *global* knowledge economy – the key objective of the European ‘Lisbon Strategy’ (EUROPEAN COUNCIL 2000). For this reason, these business activities are studied in preference to other key city-based functions, such as government departments or leisure services. Understanding precisely how and where information flows - from which companies to which other companies, from which cities to which other cities, within MCRs and between them and to the wider world, and through which channels, both personal and electronic – clearly essential to inform policy - was the central research challenge of the POLYNET study, helping us understand how Manuel Castells’ celebrated ‘space of flows’ (CASTELLS, 1996, pp. 376–428) relates to his ‘space of places’.

*Information flows*

How then to measure these flows? Information can move in two ways: electronically, or inside people’s heads for face-to-face exchange (HALL, 1995). The latter may occur daily (commuting) or less frequently and/or more irregularly (business meetings). As seen, most countries offer good commuting data but very little information on other kinds of business movements. Pioneering attempts to record information exchanges through diaries (GODDARD, 1973; CARLSTEIN *et al.*, 1978) suggest that electronic exchanges (then telephone, now also videoconferencing, e-mail and web-related as studied in POLYNET) tend to be more routine (employing what Goddard calls ‘programmed’ information) and serve as a prelude to face-to-face

meetings where ‘unprogrammed’ information is exchanged; and this point is underlined by more recent studies (MITCHELL, 1995, 1999; GRAHAM and MARVIN, 1996). This must be the key explanation for the fact that, despite predictions of the ‘death of distance’ (TOFFLER, 1980; CAIRNCROSS, 1997) and the ‘death of the city’, traditional dense central business districts still offer massive agglomeration economies, as argued long ago (HAIG, 1926). Indeed, Michael Porter’s work on clusters - ‘geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions ... in particular fields that compete but also co-operate’ (PORTER, 1998, p. 197) - can be regarded as belated recognition of a strain of economic thought that can be traced back to Alfred Marshall (MARSHALL, 1890). Empirical studies of specific APS clustering have been few: an important recent study in central London (TAYLOR *et al.*, 2003), reinforces the Porter thesis but also confirms Goddard’s finding that clustering enables the face-to-face interaction critical to establish and maintain personal relationships of trust and cooperation. Cooperation comes not only through ‘institutional thickness’ provided by closely located trade and professional institutions, but also through increasingly complex interdependencies between firms and between service providers and their customers, and also through cultural norms and associational traditions (AMIN and THRIFT, 1995). Clustering proves important for new firm formation; such central clusters contain very small offices (as well as large offices of major global firms), so that while ‘back-office’ functions may leave (or be outsourced to distant locations), the overall scale of the cluster may be little affected.



Ever since Haig’s pioneering analysis (HAIG, 1926), it has been assumed that the Central Business District (CBD) offers the highest potential for clustering, and that CBDs in large cities offer the highest potential of all. Indeed, classical urban models like those of Garrison (1959/60), Alonso (1964) and Muth (1969) were based on that assumption. But increasingly, cities take a polycentric form first identified in a pioneering theoretical study by Harris and Ullman (1945). The traditional CBD drew its agglomerative power from the close concentration of transport networks, both intra- and inter-urban, upon it; but increasingly, some networks may focus on other locations, most notably airports located at the city edge or beyond it. Accordingly, American observers have increasingly noted the phenomenon of the edge city or new downtown, located in such peripheral locations (GARREAU, 1991). Indeed, entirely new business corridors may develop along major routes leading from the city to an airport, such as the Dulles corridor in Washington DC and the Arlanda corridor in Stockholm.

**THE CRITICAL PROBLEM OF MEASUREMENT**

POLYNET seeks to bring together these four concepts: it analyses flows of information, within and between APS companies, in and between eight European polycentric MCRs. The critical problem however is how to measure the information flows thus generated. And here, there prove to be a number of difficult problems for research.

While the internal functioning of the MCRs, viewed as ‘spaces of places’, can be studied using secondary Census data (as in the first stage of the POLYNET research),

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3 a different approach is needed to measure the ‘spaces of flows’. Official statistical  
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5 sources do not distinguish between APS and other local and retail oriented services,  
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7 and they refer to national and sub-national territorial units, making the measurement  
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9 of *trans-boundary* information flows - vital in connecting regions to the world-wide  
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11 knowledge economy - impossible.  
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### 14 15 16 17 18 *Measuring spaces of flows*

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22 A crucial first approach to studying MCR ‘spaces of flows’ is a unique quantitative  
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24 method developed by the Globalisation and World Cities (GaWC) Study Group at  
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26 Loughborough University (TAYLOR, 2001) that incorporates key POLYNET  
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28 research concepts: Advanced Producer Services and Information Flows. The method  
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30 was originally devised to measure the ‘connectivity’ between ‘global cities’ that  
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32 derives from communications within cross-border APS service networks as they  
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34 conduct business across their offices world-wide. Of major relevance for the Lisbon  
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36 Strategy, the application of this method in POLYNET allows the connectivity of  
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38 European cities of *sub-global*, as well as global city status, to be measured by  
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40 studying the importance of their APS business *functions* within wider knowledge-  
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42 intensive service networks. Detailed analysis allows resultant APS ‘functional  
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44 linkages’ between the towns and cities of each region to be mapped for the very first  
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46 time, informing the issue of polycentricity that is considered vital in spatial policy  
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48 (EUROPEAN COMMISSION, 1999). A key innovation is that the method sheds light  
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50 on potential MCR *functional inter-urban networks* that are a product of connectivities  
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52 at four geographical scales: regional, national, European and global (TAYLOR *et al.*,  
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54 2006, Chapter 3). The quantitative analysis, and its extension, is the subject of a  
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separate contribution to this special issue of *Regional Studies* (TAYLOR *et al.*, 2007) however some methodological limitations are briefly considered here.

In extending and deepening the GaWC global city analysis to a transnational MCR scale, a key practical challenge is that very large primary data sets must be collected and multi-scale business connectivities and linkages between firms and cities must be analyzed. At the same time, consistency of methods must be assured to allow comparisons to be made between the MCRs. The scale of the task has had three important effects.

Firstly, *trans-national* inter-urban linkages between the MCRs are not mapped in POLYNET due to time and resource constraints, though much of the data exists to do so in a follow-up study. Secondly, in order to facilitate crucial comparisons of polycentricity *between* the MCRs, the inter-urban functional linkages of each are calculated individually as a proportion of the connectivity between the most connected, or ‘First’ city, and the second most-connected city for each region at the four regional to global geographical scales. However, there are significant differences in the connectivity of the eight MCR First Cities. For example, the global connectivity of London or Paris far exceeds that of Düsseldorf, yet these differences of ‘weight’ are not reflected in the comparative assessments of MCR polycentricity. The significance of this, and the relevance of global connectivity for MCR functional polycentricity, only becomes apparent in a different part of the research to which we turn later in this paper. Finally, the strength and importance of the *actual* linkages - flows of information - between the towns and cities of each MCR, cannot be known from the quantitative measurement of business network connectivity. Whether

information is passing between the cities – either virtually by e-mail, telephone etc, or in people's heads through business travel – can only be discovered by other means.

### *Capturing flows of information*

The attempt to address this problem is the burden of a second quantitative study which focuses on capturing vital primary data on the actual flows of information passing within and between the MCRs. But direct measurement also proves difficult.

First, e-mail traffic in particular is increasingly infected by spam and phishing. Even if spam filters are used to exclude this extraneous input, e-mails are increasingly used to convey relatively low-level routine information. Second, and more problematic, it proves extremely difficult to obtain statistically significant samples of either e- or personal traffic. The POLYNET research experience was salutary here. It was first hoped to analyse telephone traffic, with the assistance of telephone companies, and e-mail data from sent-mail and in-boxes. But we were advised that this would contravene data protection legislation in EU member states, and in addition we discovered that there was no automatic or direct correlation between IP address and the geographical location of offices. Additionally, it appears that non-work-related e-mails constitute some 40 per cent of e-mail traffic in the private sector and substantially higher in the public sector. Finally, though French data have been successfully used to map telephone traffic in the Paris Region (HALBERT, 2004), such data are not generally available anywhere.

We concluded that the practicable alternative was a web survey, in which we would ask respondents themselves to keep a record of their telephone calls and e-mail traffic and business travel for one week, and to report to us the top locations, discounting spam and other irrelevant mail. Accordingly, we approached Chief Executive Officers, whom we were interviewing in another part of the study, asking them first for their cooperation in this further work and also suggesting names of senior officials who could also be approached. Unfortunately, despite extending the time scale, the response rate proved to be generally poor. Only 442 respondents, less than 10 per cent of the several thousand individuals who were approached, completed sufficient personal information to enable analysis. The best results were obtained by the Randstad and Paris Region teams, with over 100 results each; Northern Switzerland (over 70) and Central Belgium (over 50) results were also satisfactory. The RhineRuhr and Greater Dublin teams achieved adequate returns (in the 25–40 range), but Rhine-Main and South East England lagged with 20 results or fewer. And for business travel, in particular, not all results proved to be useable; some returns started but were never completed, while others appeared implausible. Finally, relevant returns ranged from 64 in the case of the Randstad, to only seven in South East England (not all of which gave a full week’s analysis). To compound matters, many correspondents failed to give an indication of telephone or e-mail traffic; finally, there were no more than 46 complete records showing all kinds of contact for all the eight centres in aggregate, and even then, some respondents failed to complete all the cells.

Even had the POLYNET teams been more successful in achieving higher response rates, however, there would still have been a major remaining problem. This is that surveys of this type can never hope to convey the *quality* of the information that is

exchanged, either in e-traffic or personal business traffic: a single unit is counted always the same, whether it is a routine circular e-mail or a message about a critically important business contract. It might have been possible to ask respondents to estimate importance on a simple linear scale, but given the poor response even to the survey that was made, this does not seem plausible. The stark fact, therefore, is that quantitative measurement proves to reach definite limits, both in terms of practicability and also in terms of the quality of the output. The well-known plea of the market stall vendor, 'never mind the quality, feel the weight', proves as misleading in this context as in its traditional setting.

### INTERPRETING THE EMERGENCE OF THE MEGA-CITY REGION

How then to assess the element that has proved so elusive in navigating the space of flows: 'quality'? As already established, the need is to understand the quality of the information flows within, into, out of and between the constituent cities - and their FURs - that constitute a MCR. The web survey proved incapable of this task. So it is necessary to deepen the analysis, beyond simple quantitative measurement.

Semi-structured face-to-face interviews developed from previous APS studies (BEAVERSTOCK *et al.*, 2001; TAYLOR *et al.*, 2003) were the means chosen to tap into this qualitative evidence. In contradistinction to the quantitative approach which used 'harder' evidence based on large data sets, the interviews were designed to elicit 'soft' evidence on the quality of flows and on the relationships and interactions that occur, not only between but *within* cities, that are impossible to measure - the production of knowledge, its transfer and innovation - that characterize APS, and thus

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MCR functional networks. They offered the flexibility to explore multiple facets of complex spatial-functional business interrelationships, drawing on the direct experience of senior actors in firms, business and professional organizations and government agencies - the key agents creating the vital inter-linkages and flows within and between the MCRs - through their discursive reflections on the intensity and quality of those relationships and the reasons behind them. Using open-ended questions, it was possible to allow the scope and focus of discussions to follow directions deemed relevant and important by respondents, rather than those predetermined by the research investigators.

The semi-structured interview method has well-known drawbacks, both of a practical and theoretical nature, that are an ongoing subject of debate in the Social Sciences literature. Here we briefly reflect on the under-reported and more challenging methodological issues encountered in doing *trans*-national qualitative research.

In transnational research especially, the semi-structured interview is a highly time-consuming and costly method, requiring significant human as well as financial resources and posing dilemmas for coordination. First, a delicate balance is needed in designing each stage of the research – the questionnaire, sampling, data analysis, interpretation and reporting – between standardization (important to ensure comparability of results between study areas with different research cultures and traditions) and flexibility (essential to allow reflexive responses to local circumstances and differences as these emerge). Second, there are many practical problems. For example: the translation of research questions and prompts into multiple languages, whilst remaining sensitive to differences of cultural interpretation (a challenge also in

designing the web survey); travel to multiple and distant locations; and methodical analysis and reporting on extensive, detailed evidence. Structured interviews which follow a prescribed format that limits deviation, are quicker and simpler to conduct and analyze systematically and offer greater precision. But the overriding objective of the POLYNET interview study was to *complement* harder evidence and gain a deeper understanding of the relational processes underlying MCR spaces of flows, focusing on the all-important issue of quality.

To achieve this, it was considered important to encourage a learning progression through the interview process. As interviewers became more aware, prompts would be refined to widen and hone discussions until a broadly sound and comprehensive understanding of issues and circumstances was gained through the co-construction of understanding by interviewer and respondent. In similar research (COCHRANE, 1998; McDOWELL, 1998; ENGLAND, 2001; BEAVERSTOCK and BOARDWELL, 2000), this process, and the roles played by actors in it, has been keenly debated, as reported by Crang in his comprehensive annual reviews of the ‘state of the art’ in qualitative methods (CRANG, 2002, 2003). The challenge, in following this approach across eight regions in seven different European countries, was to balance the need to retain a focus on key *trans*-national research questions (prescribed in research manuals and reporting templates) with the vital need to gain in-depth understanding of the undiscovered causal relationships underpinning the quantitative evidence. The interview results, to be discussed next, are the product of a co-reflection on North West European ‘spaces of flows’ by business actors and researchers representing different perspectives, but they provide a deeper



understanding of the spatial relations occurring at the MCR scale across North West Europe, that has until now been absent to inform contemporary policy debate.

TRAWLING THE INTERVIEWS

We now turn to the interview results – more than 600 in all - and their contribution to the eight individual MCR narratives. Here, we explain the subjects reported on in detail by each team in their regional reports (<http://www.polynet.org.uk>) and transnationally in *The Polycentric Metropolis* (HALL and PAIN, 2006, pp.125-194), illustrating how the qualitative evidence has helped the researchers understand their regions, their own special and unique characteristics and their synergies with other regions. This process of discovery has been widely regarded as a highly rewarding and illuminating phase of the research, taking transnational understanding of the key research concepts and the interrelationships between them, well beyond previous studies.

All eight MCR interview reports, and the transnational comparative report, cover the following broad themes:

- 1) Firms and Places: Understanding the basic structure of each MCR; whether globalisation of APS firms contributes to *actual* linkages between the towns and cities within the region.

- 2) Sectors, Markets, Corporate Strategy: The global context. How does the globalisation of advanced services affect the functional structure of MCRs, including relationships between their 'First Cities' and other regional centres?
- 3) Flows and Relationships: Patterns of intra- and inter-regional flows and relationships between MCR offices *and* between MCR offices in the region and elsewhere: within the region, nationally, in Europe and globally. How does this inform definition of the MCR and its internal/external linkages?
- 4) People and Places: Interdependencies between the 'space of flows' and 'space of places' in the MCR.
- 5) The Regional Knowledge Economy: The relationships between the interview findings and the quantitative evidence on FURs/commuting, APS business connectivity/linkages, and business communications/travel. First, their *definition of the MCR*: the implications of intra- *and* inter-firm connectivities for *inter-urban* linkages between MCR business centres and between these and APS centres elsewhere. Second, their *conclusions on polycentricity*: issues of geographical scale, the processes involved, intensity and quality of knowledge flows/concentration, the geography of corporate decision making and power.
- 6) Key Issues for Sustainable Management: Finally, the implications for a *sustainable regional knowledge economy* and *sustainable management of the MCR*, leading to a summary of the key issues for consideration in the fifth and

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final phase of the research, the *policy analysis* (reported on in *The Polycentric Metropolis* - HALL and PAIN, 2006 and in HALBERT *et al.*, 2006a).

Here we look across these themes, and the results presented by the eight research teams, to consider the overarching evidence on MCR development processes and their implications for policy.

*The functional MCR – a globally constituted phenomenon*

The interview evidence provides a pan-North West European, cross-regional perspective on how contemporary economic globalization is shaping the functional evolution of the eight regions, essential to evaluate the reality of MCR emergence and polycentricity. A key finding is that service economy flows at an MCR scale can only be properly understood in the context of APS competition in global markets. Global market drivers are now experienced in all sectors and at all levels of service provision, not just amongst global-scope networks. The process of change is unanimously seen as structural and ongoing.

On a world scale, APS concentration is occurring in only a few select ‘global cities’. Global concentration in London makes it the international platform for business within the ‘European region’; other POLYNET First Cities are major ‘MCR hubs’ for global networks. They have a key role in facilitating access to the expanding European service market by global firms and in ‘articulating’ their regions into the ‘global city network’. This pattern of First City global concentration is consistent across all the MCRs in spite of significant differences in their urban morphology. The

morphological polycentricity of the Randstad and RhineRuhr does not translate to a balanced functional distribution between urban centres; the spatial planning concept of the 'polycentric urban region (PUR)', is overturned when connectivity in the knowledge economy is considered.

In all eight cases, regional, and some national office networks (for example in accountancy) are spread out across the MCR to be close to local markets, with national firms most likely to locate in a First or other prominent city. RhineRuhr has the largest proportion of regional firms whereas Greater Dublin and Rhine-Main have the smallest. This is significant because comparative analysis of the interview results shows that this network scale is generally associated with less complex, lower value business functions. In contrast, clustered high-value functions, derived from office links to global networks in eight urban centres outside London, not evident from quantitative analysis, suggest MCR *functional* polycentricity.

#### *Places constructed through flows*

While 'e-connectivity' is intensive, and crucial in supporting linkages to global APS networks, the most important global knowledge exchanges are taking place face-to-face in densely clustered business milieux in First Cities. Time-distance accessibility - local as well as international - is therefore essential to support functional connectivity in global APS networks and within and between the First Cities; travel is an increasingly important mobile locus for virtual information and knowledge exchange at all geographical scales. The MCRs are functionally intertwined and fluid time-spaces, connected through both physical and virtual flows and infrastructures but,

significant for policy, through global *inter-city* relationships and interaction in physically restricted, high density spaces in First Cities. This phenomenon is as true in RhineRuhr as in South East England, irrespective of the overall number of global firms present.

Internationalisation of specialised APS labour is a unique feature of *all* the First Cities, reflecting the demand for a limited supply of high skilled people globally and the value of cultural diversity in the production of ‘knowledge capital’ in some sectors, notably global financial services that are found to be the key ‘anchor’ for high-value APS clustering. The need for access to, and close proximity of, skilled APS transnational labour and firms (both of which are essential for high-complexity, non-standardised knowledge production and innovation), creates reinforcing functional centralities. But the specificity of the MCR locations, where these centralities occur, illustrates the significance of the distinctive qualities of *places* in the production and reproduction of global APS connectivity. First Cities are described as having specific ‘creative’ and/or ‘financial’ milieux that support international business. Again, of key relevance for policy, the attraction of particular cities and places for APS activity is associated with a global city ‘culture’ or ‘atmosphere’ that seems distinct from the qualities of physical infrastructure and green spaces.

*Reconsidering scale and polycentricity*

The importance of global concentration appears, at first sight, to run counter to European spatial policy which seeks to promote more balanced development through

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3 regional polycentricity (EUROPEAN COMMISSION, 1999). But the spatial  
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6 processes uncovered by the interviews are complex.  
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10 Firstly, the results reveal significant potential for information, knowledge and skills to  
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12 flow within, as well as between, the regions. Although the most important functions  
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14 and information exchanges are occurring in the highly globally connected First Cities  
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16 of each MCR, other urban centres can have important roles, supporting high-value  
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18 functions, as illustrated by the case of South East England. Here, multi-sector  
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20 clustering, through which APS firms provide services to each other, emulates unique  
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22 growth dynamics found in central London and Paris (PAIN, 2007). The underlying  
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24 conditions leading to functional, as opposed to sectoral, specialisation (a feature of  
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26 MCRs with relatively weak inter-urban functional linkages, such as the Randstad and  
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28 RhineRuhr) at different geographical scales, needs to be better understood.  
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36 Secondly, the results reveal that specific MCR delineation is arbitrary in relation to  
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38 markets and business practices in all cases. Geographical boundaries (including those  
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40 derived from contiguous FURs at the start of the study) prove to have little relevance  
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42 for firms. The MCR phenomenon can best be described as an ‘extended global city  
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44 process’ that is more, or less, functionally linked to metropolitan, regional, national  
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46 and international urban scales. A variety of multi-scale situations is identified, as  
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48 illustrated by extracts from regional reports (q. HALL and PAIN, 2006, pp. 86-87):  
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55 ‘...our understanding is that [MCR dynamics] affect the national and maybe  
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57 European or global connectivity of the APS firms located in the Rhine-Main  
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region and only to a much lesser extent their intra-regional connectivity.’  
(Rhine-Main: FISCHER *et al.*, 2005, p. 19)

‘... we learned more about the, in fact, poorly developed perception of the  
region as a complementary urban configuration.’ (RhineRuhr: KNAPP *et al.*,  
2005, p. 17)

‘... the matter is further complicated if the position of the Greater Dublin  
region within the international space of flows is taken into consideration  
...this all leaves the definition of Dublin’s mega-city region rather open and  
inconclusive.’ (Greater Dublin: SOKOL and VAN EGERAAT, 2005, p. 15)

‘...knowledge flows are as much global as they are regionally embedded, both  
within firms’ networks and externally. Knowledge would seem to be a quality  
of the firms and their [international] networks rather than a regional quality.’  
(Randstad Netherlands: LAMBREGTS *et al.*, 2005, p. 24)

‘... MCR boundaries have ‘soft’ edges and need to be defined in loose and  
flexible ways.’ (South East England: POTTS and PAIN 2005, p. 30)

‘... few firms are working or plan to work in a polycentric way ...’ (Central  
Belgium: AUJEAN *et al.*, 2005, p. 19)

‘... for Paris firms, there is no such thing as a mega-city region.’ (Paris  
Region: HALBERT 2005, p. 13)

The interview results indicate a relationship, as yet ill-understood, between urban functional and morphological configurations. It would seem that APS functional dispersion and centrality can act to reinforce spatial processes, not only at the global scale, but also at a loosely defined regional scale around global APS agglomerations – here described as the ‘Global MCR’ scale of interaction; South East England shows definite signs of emergent advanced knowledge economy regionalisation, whereas there is least evidence of this in Greater Dublin. But crucially, polycentricity is a scale-dependent concept; whether assessed by population size, or functional connectivity as in POLYNET, this can only be assessed within a specific locational context. Furthermore, polycentricity has not translated into an even territorial distribution of high-quality linkages to the knowledge economy in any of the regions studied. Even in South East England, where MCR functional polycentricity is most evident, the area east of London and the region remains largely disconnected to non-local and retail APS networks, reflecting historic economic and infrastructure development patterns.

## **KEY OVERARCHING CONCLUSIONS: COMPLEMENTARITY, POLICY AND GOVERNANCE**

The diversity of MCR functional-morphological geographies and multi-scale APS connectivity revealed in POLYNET, demonstrates the importance of their case-specific consideration and interpretation. The scale-dependency of the polycentricity concept has been shown to make it unviable as a transnational regional development



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3 tool. Territorial contexts, histories and development paths prove crucial, making one  
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5 single regional policy approach unworkable (HALBERT *et al.*, 2006b).  
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10 Importantly, there is a disjunction between the cross-cutting nature of the processes  
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12 that are now structuring emergent functional-territorial relationships and governance  
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14 structures, which relate to geo-political administrative boundaries. There is a vital  
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16 policy agenda relating to MCR development but new strategic approaches are  
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18 required to integrate economic and spatial policy, looking across territorial and policy  
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20 boundaries. A recognition of the relational nature of spaces of flows and places is  
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22 essential.  
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28 In contradiction to present European policy thinking, which remains focused on a  
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30 territorial or place related conceptualisation of spatial relations, the interviews show  
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32 that - in a space that is defined by flows - global functional concentration and  
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34 clustering in First Cities constitutes global *connectivity agglomeration* which benefits  
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36 regional and national economies *and* generates inter-city functional linkages at cross-  
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38 cutting scales (metropolitan, regional, national and international). Yet, at the same  
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40 time, there is no evidence of de-clustering of high-complexity, high-skill global  
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42 functions from any of the POLYNET First Cities.  
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50 What overall conclusions can be drawn?  
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55 At a *transnational North West European scale*, functional linkages and flows between  
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57 the MCR First Cities are strong. A great volume of high-value interactions links them  
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59 in the APS world city network. For firms, it is relationships *within* First Cities and  
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3 *between* them and with the other major business cities they relate to, that predominate  
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5 – a spatial scale of *inter-city* relations and *functional complementarity* that allows  
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7 information and knowledge to be produced, exchanged and circulated through  
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9 different modes. First City connections, extending beyond their regional and national  
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11 economies, give them a strategic global-local role as knowledge gateways at the  
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13 intersection between international, MCR and national markets. Their urban functional  
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15 relationships are therefore synergistic and should not be confused with the concept of  
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17 ‘competitiveness’ in markets.  
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24 At a *Member State scale*, national contexts (including regulatory environments) still  
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26 prove highly significant in shaping individual regional situations. Further in-depth  
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28 understanding of the way in which national differences and APS interrelate to  
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30 promote functional clusters and flows within the MCRs, and to other cities and  
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32 regions, nationally and transnationally, is therefore of key importance to inform  
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34 European policy in support of sustainable economic development (HALBERT *et al.*,  
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36 2006b).  
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43 At a *national and sub-national scale*, public-private interventions to support  
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45 accessibility through transport and e-infrastructures, education and housing, are  
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47 critical for the practical operation of regional spaces of flows. Commuting and  
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49 business travel (a feature of urban polycentricity at all geographical scales) are shown  
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51 to be especially car reliant at the emergent *mega-city region* scale, cross-cutting hub-  
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53 and-spoke public transport networks. Both morphologically and functionally  
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55 polycentric POLYNET regions are generating growing non-radial, inter-urban travel,  
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57 compromising priorities for environmental sustainability (PAIN, 2006).  
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Finally, at a *pan-European scale*, disjunctions between MCR formation, sustainable management and governance are of key importance. Tensions identified between morphological polycentricity and economic growth, and between regional polycentricity and environmental sustainability, are not currently reflected in policy frameworks that cascade down from the Lisbon-Gothenburg Agenda, the ESDP, nor in the recent Spatial Vision Study (EUROPEAN COUNCIL, 2000; EUROPEAN COMMISSION, 1999, 2003; UNIVERSITY OF THE WEST OF ENGLAND, 2005). Connectivity to the global knowledge-based economy, shown to be associated with First City concentration, is a key Lisbon Agenda priority, yet current interpretation of ESDP advice (supported by EU regional development funding) is aimed at territorial ‘rebalancing’ (PAIN, 2006; HALBERT *et al.*, 2006b).

**MCR PROCESSES - WEIGHING THE EVIDENCE**

The POLYNET findings demonstrate the potential added value of integration between qualitative and quantitative methods in similar spatial studies. MCR processes are shown to construct an important ‘relational space’ in which the quality of interactions (essential for innovation, knowledge production and transfer) *within* cities, as well as the flows *between* them, are of key importance. But, as discussed, the ‘weight’ and value of both are difficult to quantify, hence the importance of ‘mining’ the interviews alongside the quantitative data for each region.

Reflection on the quantitative evidence, in light of the interviews, demonstrates that the eight study regions of North West Europe are more than a sum of their parts. They

are highly connected through their First Cities and they share common issues and policy challenges; the remaining unresolved questions for North West European MCR emergence and policy (discussed in detail in HALL and PAIN, 2006) require further research and transnational action:

- The basis of functional specialisation and urban inter-linkages across space at different scales
- Interrelationships between advanced knowledge-based services and the wider economy with a broader spectrum of skills and jobs
- The underlying reasons behind national, regional and metropolitan distinctions.

A further important question, which goes beyond the remit of the North West Europe INTERREG funding programme, is how future interdependencies between spaces of places and flows will develop at a pan-European Union (EU) scale? Are functional urban inter-linkages identified in the eight regions of North West Europe also promoting Europe-wide MCR emergence? The functional complementarity of Europe's business capitals in Advanced Producer Services is likely to be crucial in this process – an issue that demands geographically extended transnational research and policy review within the North West zone and at an EU-wide scale. POLYNET interviews revealed that with regard to the eight regions that have been the focus of the present study, functional specialisation between First cities and between First Cities and MCR secondary centres, should be understood as a non-zero sum game that produces economic complementarities between them. However, some cities as important as Amsterdam and Frankfurt were identified as having an economic one-

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dimensional quality in comparison with multi-functional metropolises like London or Paris, which put their polycentric regions at a disadvantage. This finding contradicts present policy thinking which advocates a balanced distribution of service functions between cities at intra- and inter-regional scales.

The POLYNET results suggest that transnational cooperation needs to go beyond the affirmation and implementation of existing policy edicts which are shown to be contradictory with respect to priorities for polycentricity and sustainable development. In particular, the application of the concept of polycentricity through the ESDP and the North West Europe *Spatial Vision*, and current support for this through structural and cohesion funds, requires urgent reconsideration to focus on the complementarity of emergent inter-urban and functional relations rather than an objective of simple geographical consistency. The use of the concept of polycentricity in European policy, first questioned by Davoudi (2003) and the Taylor *et al.*, (2003) London study which preceded POLYNET, is shown to require further examination and research.

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